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$$\int_a^b f(x) dx = \lim_{\Delta x \rightarrow 0} \sum f(x_i) \Delta x$$

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21.

$$f(x) = \sqrt{x^3 + 2}$$

$$g(3) = 5$$

$$g(x) = \int \sqrt{x^3 + 2} \, dx$$

$$g(1) = ?$$

$$g'(x) = f(x)$$

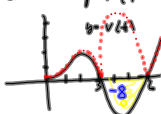
$$g(x) = \int_3^x \sqrt{t^3 + 2} \, dt + 5$$

$$g(1) = \int_3^1 \sqrt{t^3 + 2} \, dt + 5$$

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Review 14 rates of change
slopefields

do #2 p 147



a) slope pos
(0, 2) to (4.5, 6)

b) speed dec.
|v| dec
(2, 3) to (4.5, 6)

c) ave acceleration
ave value of accel.

$$\frac{1}{b-a} \int_a^b a(t) \, dt$$

$$\frac{1}{b-a} \left(v(t) \right)_a^b$$

$$\frac{1}{b-a} (v(b) - v(a))$$

$$\frac{v(b) - v(a)}{b-a}$$

$$\frac{v(5) - v(1)}{5-1} = \frac{-5}{4}$$

d) if initial $x(1) = 10$ estimate final $x(6)$
 $x(t)$ = position at time = t

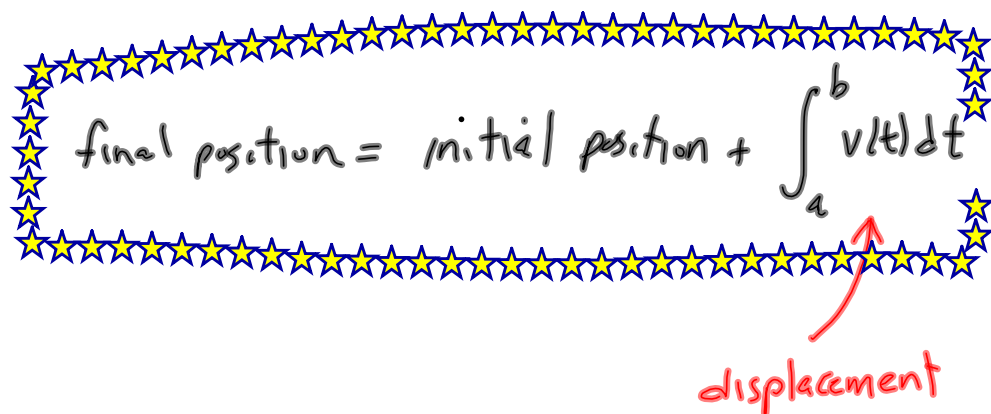
final = initial + displacement

$$= 10 + \int_1^6 v(t) \, dt$$

$$= 10 - 8$$

$$= 2$$

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$$\text{final position} = \text{initial position} + \int_a^b v(t) dt$$

displacement

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ave rate of $f(x)$

$$\frac{f(b) - f(a)}{b - a}$$

ave value of $f(x)$

$$\frac{1}{b-a} \int_a^b f(x) dx$$

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$$\begin{array}{l} \text{ave value of } f' = \frac{1}{b-a} \int_a^b f'(x) dx \\ \quad \quad \quad \updownarrow \\ \text{ave rate of } f = \frac{f(b) - f(a)}{b-a} \end{array}$$

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